



February 15, 2019

Arizona Department of Environmental Quality
Attention Mindi Cross, SWP Inspections & Compliance Enforcement Unit
1110 W. Washington Street
Phoenix, Arizona 85007
MC: 5415B-2

Re: Compliance Documentation for Solid Solutions' Desert Ridge Farms Biosolids
Land Application Activities

Dear Ms. Cross:

Solid Solutions, a Denali Water Solutions company, received the Notice of Violation letter from the Arizona Department of Environmental Quality (ADEQ) – Case ID#: 180183 dated February 6, 2019 (Letter). The Letter alleges that a violation of an environmental requirement has occurred at Solid Solutions' Desert Ridge Farms site. Solid Solutions' believes no violations occurred. This letter and the information attached will serve as Solid Solutions' assertion that no violations occurred.

ADEQ's Letter alleges four (4) Arizona Administrative Codes under Rule 18-9 may have been violated by Solid Solutions. The following are the violations alleged by ADEQ in the Letter and Solid Solutions' justification that the violations did not occur:

1. A.A.C R18-9-1007(A)(7) – Application of bulk biosolids at an application rate greater than the agronomic rate of the vegetation or crop grown on the site.

Solid Solutions' original Biosolids Annual Reports for 2014 to 2017 listed the crops the farmer planned on growing on each field. A.A.C R18-9-1001 defines the Agronomic Rate as the biosolids application rate that meets the amount of nitrogen needed by a planned or actual crop. In our original Biosolids Annual Reports for 2014 to 2017, we listed the crops the Desert Ridge Farms planned on growing, and used a calculation described in the EPA's Process Design Manual – Land Application of Sewage Sludge and Domestic Septage (EPA Manual) to determine the amount of nitrogen in the biosolids applied. The EPA's nitrogen calculation does not consider the climatic and site conditions of Desert Ridge Farms. When we revised the Biosolids Annual Reports for 2014 to 2017 with the actual crops grown, we used a nitrogen concentration calculation provided to us by a local professional agronomist that takes the site conditions at Desert Ridge Farms into consideration. The calculated nitrogen concentrations applied to Desert Ridge Farms' fields in our revised 2014 to 2017 Biosolids Annual Reports do not exceed the agronomic rate of the actual crops grown.

2. A.A.C R18-9-1014(E)(2)(a) – Failure to Report to ADEQ by February 19, the amount of biosolids applied at a site used for the application for non-exceptional quality bulk biosolids in the previous calendar year.

ADEQ alleges that Solid Solutions did not report the amount of biosolids applied in 2015 from the generators LACSD – Carson WWTP and Los Alisos WWTP by February 19, 2016. Both of these generators were included in Solid Solutions' 2015 Annual Report sent to ADEQ via FedEx. We attached a cover page to our 2015 Biosolids Annual Report sent to ADEQ that lists the generators included in our report to be sure that ADEQ receives all the reports we submitted. Attached is a copy of that cover page submitted with our 2015 Biosolids Annual Report. The Biosolids Annual Report cover page includes LACSD – Carson WWTP (Los Angeles County Sanitation District) and Los Olisos WWTP as generators whose biosolids were applied by Solid Solutions in 2015.

3. A.A.C R18-9-1003(C) – Failure to obtain, submit to ADEQ, or maintain the necessary information needed to comply with the applicable biosolids rules.

Solid Solutions has maintained the information required by the applicable biosolids rule, including the following items listed in the Letter:

1. ADEQ alleges Solid Solutions was land applying biosolids for crops with different agronomic rates than the actual crops grown. Solid Solutions applied Desert Ridge Farms at the agronomic rate of the planned crops at Desert Ridge Farms. A.A.C R 18-9-1001 defines the agronomic rate as the biosolids application rate that meets the amount of nitrogen needed by a planned or actual crop. We kept track of the crops that Desert Ridge Farms planned to grow after our application of biosolids.
 2. ADEQ states no supporting documentation was provided to ADEQ to justify the changes in the nitrogen contraction applied to Desert Ridge Farms. The justification of these changes of nitrogen amounts applied to Desert Ridge Farms are explained below.
 3. ADEQ alleges that Solid Solutions did not include all generators in our 2015 Biosolids Annual Report when submitted by February 19, 2016. Solid Solutions maintained the necessary information for all generators applied at Desert Ridge Farms in 2015. As described above, the 2015 Biosolids Annual Report did include all generators land applied. The cover page (copy attached) lists all our generators whose biosolids we land applied in 2015 and was attached to the 2015 Biosolids Annual Report.
4. A.A.C R 18-9-1014(G) – Failure to include a certification statement, signed by a responsible official, with a required biosolids self-monitoring report.

ADEQ alleges that Solid Solutions 2017 Biosolids Annual Report for 2017 was not signed. ADEQ's Biosolids Annual Report Forms include a certification statement and an area where for a responsible official to sign. Solid Solutions sent the 2017 Biosolids Annual Report, which includes a certification statement and signature by Chris Marks, via FedEx to ADEQ on February 16, 2019. According to the FedEx invoice attached, the package was delivered on February 20, 2018 and signed by P. Serban (February 19, 2018 was a holiday and ADEQ's offices were not open). On or around July 9, 2018, Andy

Koester from ADEQ contacted Chris Marks with Solid Solutions stating that ADEQ could not locate Solid Solutions' 2017 Biosolids Annual Report and asked for an emailed copy. Mr. Marks emailed Mr. Koester an electronic copy on July 9, 2018 which did not include a signature. The lack of a signature on the 2017 Annual Biosolids Report is apparently due to ADEQ misplacing the signed mailed copy and having only an electronic copy to reference.

Documenting Compliance

ADEQ's Letter includes a section that asks Solid Solutions to document compliance of five areas. The following is Solid Solutions responses to the Letter's Section II. Documenting Compliance:

1. Justify the revisions to Solid Solutions Biosolids Annual Report, including calculations used by Solid Solutions to make their determination that biosolids were not applied at an agronomic rate greater than the agronomic rate of the crop grown

When determining the amount of total Plant Available Nitrogen (PAN) in the biosolids applied to Desert Ridge Farms, Solid Solutions previously used a calculation found in the EPA's Process Design Manual – Land Application of Sewage Sludge and Domestic Septage (EPA Manual). This calculation used assumptions to determine the amount of nitrogen that becomes available from organic nitrogen and ammonia after being land applied. Solid Solutions land applied biosolids to Desert Ridge Farms at no more than the amount of PAN needed to meet the nitrogen need of the crop. The amount of PAN applied was reported under the ADEQ's Biosolids Annual Report Chart header titled Nitrogen Concentration (Organic Nitrogen plus Ammonium) on the original Biosolids Annual Reports for 2014 to 2017.

When we completed our revised Biosolids Annual Reports for 2014 to 2017, we used a different PAN calculation after observing the biosolids land applier AgTech, the farm adjacent to Desert Ridge Farms, land applying biosolids at rates 2-3 times higher than our applications for similar crops. This observation led us to examine their 2016 and 2017 ADEQ Biosolids Annual Reports where we found that they were applying biosolids from OCSD-2 (Orange County Sanitation District Plant 2) at rates as high as 233 dry metric tons per hectare on a wheat crop with an agronomic rate of 280 kg/ha (field ID 2311026 in 2017). We reviewed the the lab analyses of OCSD-2's on Orange County Sanitation District's (OCSD) website and found that OCSD's biosolids lab analysis is very similar to the biosolids we applied at Desert Ridge Farms. If we land applied OCSD's biosolids using the PAN calculation from EPA's Manual we would have only been allowed to apply OCSD's biosolids at a rate no higher than 9.3 dry metric tons per acre to provide 280 kg/ha of nitrogen. After discovering this large discrepancy between our biosolids application rate and the farm next door, we reached out to a local professional agronomist to determine a PAN rate specific to Desert Ridge Farms.

The EPA's PAN calculation is a general calculation and didn't factor in Desert Ridge Farm's soil types and Yuma's extreme climatic conditions. The EPA does recommend using a local professional agronomist to determine biosolids application rates. The agronomist we consulted provided us a PAN calculation that appears similar to the one

used by Desert Ridge Farms' neighbor, although the agronomist's rates are still not as high as AgTech's. The site specific PAN calculation provided by the agronomist is the calculation we used to determine the PAN applied at Desert Ridge Farms in our revised Biosolids Annual Reports for 2014-2017.

The site specific PAN calculation recommended by the local professional agronomist we consulted used in our revised Biosolids Annual Report assumes:

- 10% of ammonia will become plant available nitrogen
- 7% of organic nitrogen will become plant available nitrogen in the first year of the application
- 3% of the remaining organic nitrogen will become plant available nitrogen in the second year of the application as residual nitrogen

Please see the attached letter from the local professional agronomist, Curtis Pate of Agtegrity, Inc., for his recommended assumptions to calculate PAN at Desert Ridge Farms.

2. Justify the changes made to each revision of the number reported for the Loading Rates for the Biosolids Annual Reports for 2014 to 2018.

Solid Solutions did not make any revisions to the Loading Rates (dry tons/acre) in the revised Biosolids Annual Report for 2014 to 2017. The only changes made on the Biosolids Annual Reports for 2014 to 2017 were crops and Nitrogen Concentration applied.

3. Provide any sampling or any other procedures used by to determine the nitrogen calculation of the Desert Ridge Farms fields to determine the appropriate loading rates for biosolids land applications that occurred between 2013 and 2018.

Solid Solutions calculates the amount of residual nitrogen remaining in Desert Ridge Farms' fields using calculated organic nitrogen mineralization rates. In the past, Solid Solutions' used the mineralization recommended in the EPA Manual, which assumes 10% of the remaining organic nitrogen mineralizes as available nitrogen the year after a biosolids application, and 5% of the remaining organic nitrogen mineralizes as available nitrogen the third year after application. After consulting with a local professional agronomist, we assume 3% of the remaining organic nitrogen mineralizes as available nitrogen the year after application as per his recommendation.

4. Where revisions were made to Nitrogen Concentrations for Solid Solutions Biosolids Annual Reports for 2014 to 2017, provide laboratory analysis justifying these revisions.

ADEQ's Biosolids Annual Report form requires biosolids land applicators to report the "Nitrogen Concentration Organic + ammonium (kg/ha)" applied to each field by generator. Solid Solutions has always reported the calculated PAN as the Nitrogen Concentration in the ADEQ Biosolids Annual Report. PAN is determined using a calculation that assumes a portion of organic nitrogen mineralizes and a portion of ammonia volatilized. The reporting of the PAN applied under the Nitrogen Concentration section of ADEQ's Report Chart was done by Solid Solutions only after

discussions with ADEQ staff in the past including Diane Reed, Bodo Dienst and Rob Phalen. This resulted in the revisions in the Nitrogen Concentration from the original Annual Reports to the revised Annual Reports.

Attached are copies of several lab analyses used to determine the Nitrogen Concentration on the revised Biosolids Annual Reports. There are over 200 lab results used between 2014 and 2017 to complete the Biosolids Annual Reports. Additional lab analyses can be provided as requested.

Lastly, as noted in the Letter, Solid Solutions will provide a description of the activities and measures that will be taken by Solid Solutions to ensure compliance with management practices in A.A.C R18-9-1007 and R18-9-1008 specifically documenting actions to ensure that biosolids are not applied at an application rate greater than the agronomic rate of the actual vegetation or crop grown by February 23, 2019.

If you have any further questions regarding Solid Solutions land application operations, please contact me at chrisamarks@comcast.net or (760) 801-3175.

Sincerely,

Chris Marks
Attachments

ATTACHMENTS

- 1. Professional Agronomist PAN Recommendation Letter**
- 2. Solid Solutions 2015 Biosolids Annual Report Cover Page**
- 3. FedEx Delivery Invoice – February 20, 2018**
- 4. Biosolids Lab Analyses Examples – City of Riverside**



YUMA MESA SLUDGE USE

2019

Mr. Marks,

I received the information you sent regarding the biosolids soil amendment you are land applying on the south mesa of Yuma, Arizona, including the calculation used for determining the amount of Plant Available Nitrogen (PAN) in the biosolids, and lab analyses of the biosolids. While I have not soil tested this particular field, I have experience with nearby farms. The CEC ranges from 6 – 15 in this area, meaning it moves from a sand to a loamy sand. After reviewing this information, it is my opinion that the EPA calculation used appears to be overestimating the efficiency of PAN in this region.

Recommended Ammonia Volatilization Rate

The calculation provided to determine the amount of PAN in biosolids uses an ammonia volatilization rate and nitrogen mineralization rate established in the EPA's Process Design Manual for the Land Application of Sewage Sludge and Domestic Septage assuming Midwest conditions. The ammonia volatilization rate in this calculation assumes 50% of ammonia volatilizes when surface applied to a field. This assumption is appropriate when farming in most climates in the US, but not in the hot, dry climatic and soil conditions of the field on the south mesa of Yuma and the farming practices of the farm that received the biosolids. Ammonia losses due to volatilization increase when the material is exposed to the atmosphere. When organic materials are applied to a sandy soil, the material is exposed to the atmosphere much more than in an average climate and a finer textured soil, leading to greater potential for volatilization. Exposing the organic materials to a dry and hot climate like Yuma will also lead to an increase in volatilization as compared to more temperate climates. Delays in planting and irrigating a field after applying organic materials will lead to further drying and break down of the material, another factor in volatilization rates. And a lack of acidity in the soil increases the transformation of ammonium to ammonia due to a lack of free hydrogen ions, leading to volatilization. For these reasons, I recommend using an ammonia volatilization rate between 80-90% when calculating the PAN in biosolids.

Recommended Nitrogen Mineralization Rate

The nitrogen mineralization rate in the EPA's calculation assumes 20% of organic nitrogen in anaerobic biosolids mineralizes in the first year after the application to the soil. This assumption is appropriate when farming in most climates in the US, but not in the climatic and soil conditions of the field on the south mesa of Yuma and the farming practices of the farm that received the biosolids. According to the study used to establish nitrogen mineralization rates in biosolids used by the EPA, mineralization rates in anaerobically digested biosolids vary from 4% to 48%. Mineralization rates are highest when soil moisture and temperature are adequate to facilitate the conversion of organic nitrogen to mineral forms of nitrogen like nitrate. The fields on the Yuma mesa are sands, which have limited water holding capacity provide deeper aerobic zones. Yuma's hot and dry climate results in high evaporation rates and low soil moisture. These factors will result in much lower mineralization rates than other areas in the US. For these reasons, I recommend using a nitrogen mineralization rate of 7-9% the first year of the application and 3-5% the second year.

Closing

My primary concern after looking over the information provided is that application rates could be limited based on heavy metals, instead of N mineralization rate. Further study to compare application rates and crop removal and soil samples from this site are needed.

Curtis Pate, CCA, PCA

A handwritten signature in black ink, appearing to read "Curt Pate", written over a horizontal line.

Agtegrity, Inc



Garden Grove, CA 92845
Phone: 714-799-0801
Fax: 714-799-0140

Solid Solutions, a Denali Water Solutions company

**Arizona Department of Environmental Quality
2015 Annual Report**





Garden Grove, CA 92845
Phone: 714-799-0801
Fax: 714-799-0140

February 17, 2016

State Biosolids Coordinator
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, Arizona 85007

Enclosed is Solid Solutions, a Denali Water Solutions company, 2015 Annual Report for our biosolids management program in Arizona. We compiled the requested information.

Enclosed in this report are the annual reports for all the biosolids Solid Solutions managed in Arizona. This includes reports for:

City of Colton
City of Corona
Coachella Sanitation District
Encina Wastewater Authority
City of Fallbrook
Los Olisos WWTP
City of Los Angeles – Hyperion WTP
City of Los Angeles – Terminal Island WTP
Los Angeles County Sanitation District
City of Mesa – Greenfield Water Reclamation Facility
City of Mesa – Northwest Mesa Water Reclamation Facility
City of Oceanside - La Salina WWTP
City of Oceanside - San Luis Rey WWTP
City of Riverside WWTP
City of San Diego – MBC

If you have any questions or have if you need any additional information from us, please contact me at (760) 801-3175.

Sincerely, -

A handwritten signature in black ink, appearing to read "Chris Marks", is written over the "Sincerely, -" text.

Chris Marks
Regional Environmental Manager



Invoice Number	Invoice Date	Account Number	Page
6-097-13782	Feb 22, 2018	4173-7884-7	5 of 7

Tracking ID: 771485407203 continued

Declared Value	USD 200.00	Transportation Charge	62.61
Delivered	Feb 15, 2018 09:00	Fuel Surcharge	3.91
Svc Area	A1	Adult Signature	5.75
Signed by	M.AILROOM	Declared Value Charge	3.00
FedEx Use	000000000/1574/_	Total Charge	USD \$75.27

Ship Date: Feb 16, 2018

Cust. Ref.: NO REFERENCE INFORMATION

Ref.#2:

Payor: Shipper

Ref.#3:

- Fuel Surcharge - FedEx has applied a fuel surcharge of 6.25% to this shipment.
- Distance Based Pricing, Zone 5
- Package sent from: 94901 zip code

Automation INET
Tracking ID 771507184911
Service Type FedEx Standard Overnight
Package Type FedEx Envelope
Zone 05
Packages 1
Rated Weight N/A
Delivered Feb 20, 2018 09:27
Svc Area A1
Signed by P.SERBAN
FedEx Use 000000000/233/_

Sender
Denali Water Solutions
Denali Water Solutions
3308 Bernice Avenue
RUSSELLVILLE AR 72801 US

Recipient
AZDES Individual Permits Unit
Arizona Deratament of Envir Qu
1110 W Washington St
PHOENIX AZ 85007 US

Transportation Charge	36.10
Fuel Surcharge	2.26
Total Charge	USD \$38.36

Ship Date: Feb 16, 2018

Cust. Ref.: NO REFERENCE INFORMATION

Ref.#2:

Payor: Shipper

Ref.#3:

- Fuel Surcharge - FedEx has applied a fuel surcharge of 6.25% to this shipment.
- Distance Based Pricing, Zone 4
- Package sent from: 30067 zip code

Automation AWB
Tracking ID 811668184041
Service Type FedEx Standard Overnight
Package Type FedEx Envelope
Zone 04
Packages 1
Rated Weight N/A
Delivered Feb 19, 2018 10:51
Svc Area AA
Signed by K.DEAL
FedEx Use 004777929/222/_

Sender
STEVE HANE
DENALI WATER SOLUTIONS
3308 BERNICE AVE
RUSSELLVILLE AR 72802-8465 US

Recipient
ANGSA BEGMAN
DEMAI WATON
3308 BERNAVE AVE
RUSSELLVILLE AR 72802 US

Transportation Charge	33.80
Fuel Surcharge	2.11
Total Charge	USD \$35.91

Ship Date: Feb 19, 2018

Cust. Ref.: NO REFERENCE INFORMATION

Ref.#2:

Payor: Shipper

Ref.#3:

- Fuel Surcharge - FedEx has applied a fuel surcharge of 5.50% to this shipment.
- Distance Based Pricing, Zone 5
- Package sent from: 78577 zip code

Automation AWB
Tracking ID 810710793098
Service Type FedEx Standard Overnight
Package Type FedEx Envelope
Zone 05
Packages 1
Rated Weight N/A
Delivered Feb 20, 2018 09:14
Svc Area AA
Signed by K.DEAL
FedEx Use 005089540/233/_

Sender
BERNARD MATOTE
DENALI WATER SOLUTIONS
3308 BERNICE AVE
RUSSELLVILLE AR 72802-8465 US

Recipient
MIGUEEL NAVR
DENALI WATER SOLUTIONS
3308 DEVNCE AVE
RUSSELLVILLE AR 72802 US

Transportation Charge	36.10
Fuel Surcharge	1.99
Total Charge	USD \$38.09

Report Number: 14-206-0206

Account Number: 11035

Submitted By: JOEL SANTOS



A&L Eastern Laboratories, Inc.

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401 Fax (804) 271-6446

Send To: Terra Renewal LLC
12812 VALLEY VIEW ST
SUITE 9
GARDEN GROVE, CA 92845

Project : RIVER SIDE
AZ#0629

Lab Number : 56696

Sample Id : RIVER SIDE

REPORT OF ANALYSIS

Date Sampled: 7/24/2014 09:30:00

Date Received: 07/25/2014 00:00

Date Reported: 07/31/2014

PARAMETER	RESULT (%)	RESULT (mg/kg)	QUANTITATION LIMIT (mg/kg*)	ANALYST	ANALYSIS DATE/TIME	METHOD
Total Solids *	21.07	210700	100.0	JM	07/25/2014 15:00	SM-2540G
Moisture *	78.93		100.0	JM	07/25/2014 15:00	SM-2540G
Total Kjeldahl Nitrogen	6.50	65000	10.0	JM	07/28/2014 09:00	SM-4500-NH3C-TKN
Total Phosphorus	3.24	32400	100	KM	07/30/2014 16:12	SW-6010B
Total Potassium	0.17	1720	100	KM	07/30/2014 16:12	SW-6010B
Total Sulfur	1.42	14200	100	KM	07/30/2014 16:12	SW-6010B
Total Calcium	3.46	34600	100	KM	07/30/2014 16:12	SW-6010B
Total Magnesium	0.56	5610	100	KM	07/30/2014 16:12	SW-6010B
Total Sodium	0.08	796	100	KM	07/30/2014 16:12	SW-6010B
Total Iron		32400	100	KM	07/30/2014 16:12	SW-6010B
Total Aluminum		4800	100	KM	07/30/2014 16:12	SW-6010B
Total Manganese		191	5	KM	07/30/2014 16:12	SW-6010B
Total Copper		740	5	KM	07/30/2014 16:12	SW-6010B
Total Zinc		877	5	KM	07/30/2014 16:12	SW-6010B
Ammonia Nitrogen	1.34	13400	10.0	JM	07/28/2014 09:00	SM-4500-NH3C
Organic N	5.16	51600	10.0		07/28/2014 09:00	CALCULATION
Nitrate+Nitrite-N		7.59	2.00	JM	07/28/2014 08:20	SM-4500NO3F
Total Cadmium		2.0	2.0	KM	07/30/2014 16:12	SW-6010B

All values are on a dry weight basis except as noted by asterisk. Detection limit on all N series is on a wet basis.

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Debbie Holt

DENALI_001541

Report Number: 14-206-0206

Account Number: 11035

Submitted By: JOEL SANTOS

**A&L Eastern Laboratories, Inc.**

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401 Fax (804) 271-6446

Send To: Terra Renewal LLC
12812 VALLEY VIEW ST
SUITE 9
GARDEN GROVE , CA 92845

Project : RIVER SIDE
AZ#0629

Lab Number : 56696

Sample Id : RIVER SIDE

REPORT OF ANALYSIS

Date Sampled: 7/24/2014 09:30:00

Date Received: 07/25/2014 00:00

Date Reported: 07/31/2014

PARAMETER	RESULT (%)	RESULT (mg/kg)	QUANTITATION LIMIT (mg/kg*)	ANALYST	ANALYSIS DATE/TIME	METHOD
Total Chromium		46	5	KM	07/30/2014 16:12	SW-6010B
Total Nickel		23	5	KM	07/30/2014 16:12	SW-6010B
Total Lead		19	5	KM	07/30/2014 16:12	SW-6010B
Total Arsenic		7.0	3.0	KM	07/30/2014 16:12	SW-6010B
Total Mercury		0.6	0.4	KM	07/28/2014 09:00	SW-7471A
Total Selenium		<5.0	5.0	KM	07/30/2014 16:12	SW-6010B
Total Molybdenum		66	5	KM	07/30/2014 16:12	SW-6010B

Comments:

SULFUR NOT FOR COMPLIANCE PURPOSES

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Debbie Holt

DENALI_001542

Report Number: 17-304-9203

Account Number: 11035



7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 ° Fax 804-271-6446
www.waypointanalytical.com

Send To: Denali Water
Cindy Duenes
2001 Key Street
Colton , CA 92324

Project : RIV

Lab Number : 56912

Sample Id : RIV

REPORT OF ANALYSIS

Date Sampled: 10/27/2017 09:00:00

Date Received: 10/31/2017 00:00

Date Reported: 12/14/2017

PARAMETER	RESULT (%)	RESULT (mg/kg)	QUANTITATION LIMIT (mg/kg*)	ANALYST	ANALYSIS DATE/TIME	METHOD
Total Solids *	19.82	198200	100.0	JM	10/31/2017 15:00	SM-2540G
Moisture *	80.17		100.0	JM	10/31/2017 15:00	SM-2540G
Total Kjeldahl Nitrogen	6.15	61500	50.0	JM	11/01/2017 09:00	SM-4500-NH3C-TKN
Total Phosphorus	2.80	28000	100	MOS	11/06/2017 16:40	6010C
Total Potassium	0.15	1470	100	MOS	11/06/2017 16:40	6010C
Total Sulfur	1.28	12800	100	MOS	11/06/2017 16:40	6010C
Total Calcium	3.71	37100	100	MOS	11/06/2017 16:40	6010C
Total Magnesium	0.42	4180	100	MOS	11/06/2017 16:40	6010C
Total Sodium	0.09	874	100	MOS	11/06/2017 16:40	6010C
Total Iron		18800	100	MOS	11/06/2017 16:40	6010C
Total Aluminum		4520	100	MOS	11/06/2017 16:40	6010C
Total Manganese		195	5.00	MOS	11/06/2017 16:40	6010C
Total Copper		807	5.00	MOS	11/06/2017 16:40	6010C
Total Zinc		837	5.00	MOS	11/06/2017 16:40	6010C
Ammonia Nitrogen	1.29	12900	50.0	R D	11/01/2017 09:00	SM-4500-NH3C
Organic N	4.86	48600	50.0		11/01/2017 09:00	CALCULATION
Nitrate+Nitrite-N		<2.24	2.24	SJB	11/02/2017 12:45	4500NO3F-2011

All values are on a dry weight basis except as noted by asterisk. Detection limit on all N series is on a wet basis.

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Pauric McGroary
Agronomist

DENALI_001543

Report Number: 17-304-9203

Account Number: 11035



7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 ° Fax 804-271-6446
www.waypointanalytical.com

Send To: Denali Water
Cindy Duenes
2001 Key Street
Colton , CA 92324

Project : RIV

Lab Number : 56912

Sample Id : RIV

REPORT OF ANALYSIS

Date Sampled: 10/27/2017 09:00:00

Date Received: 10/31/2017 00:00

Date Reported: 12/14/2017

PARAMETER	RESULT (%)	RESULT (mg/kg)	QUANTITATION LIMIT (mg/kg*)	ANALYST	ANALYSIS DATE/TIME	METHOD
Total Cadmium		<2.00	2.00	MOS	11/06/2017 16:40	6010C
Total Chromium		31.9	5.00	MOS	11/06/2017 16:40	6010C
Total Nickel		17.6	5.00	MOS	11/06/2017 16:40	6010C
Total Lead		17.9	5.00	MOS	11/06/2017 16:40	6010C
Total Arsenic		7.36	3.00	MOS	11/06/2017 16:40	6010C
Total Mercury		<0.400	0.400	SJB	11/06/2017 10:33	SW-7471B
Total Selenium		5.13	5.00	MOS	11/06/2017 16:40	6010C
Total Molybdenum		27.2	5.00	MOS	11/07/2017 12:18	6010C

Comments:

AZ CERT#0629

SULFUR NOT FOR COMPLIANCE PURPOSES

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Pauric McGroary
Agronomist

DENALI_001544

Report Number: 13-357-0206

Account Number: 11035



A&L Eastern Laboratories, Inc.

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401 Fax (804) 271-6446

Send To: Terra Renewal LLC
12812 VALLEY VIEW ST
SUITE 9
GARDEN GROVE, CA 92845

Project : RIV
AZ#0629

Lab Number : 97234

Sample Id : RIV

REPORT OF ANALYSIS

Date Sampled: 12/19/2013 07:00:00

Date Received: 12/23/2013 00:00

Date Reported: 01/06/2014

PARAMETER	RESULT (%)	RESULT (mg/kg)	QUANTITATION LIMIT (mg/kg*)	ANALYST	ANALYSIS DATE/TIME	METHOD
Total Solids *	20.99	209900	100.0	BW	12/23/2013 14:39	SM-2540G
Moisture *	79.01		100.0	BW	12/23/2013 14:39	SM-2540G
Total Kjeldahl Nitrogen	6.34	63400	10.0	JM	12/30/2013 08:10	SM-4500-NH3C-TKN
Total Phosphorus	2.80	28000	100	KM	01/03/2014 12:10	SW-6010B
Total Potassium	0.16	1610	100	KM	01/03/2014 12:10	SW-6010B
Total Sulfur	1.45	14500	100	KM	01/03/2014 12:10	SW-6010B
Total Calcium	3.36	33600	100	KM	01/03/2014 12:10	SW-6010B
Total Magnesium	0.48	4770	100	KM	01/03/2014 12:10	SW-6010B
Total Sodium	0.07	749	100	KM	01/03/2014 12:10	SW-6010B
Total Iron		26100	100	KM	01/03/2014 12:10	SW-6010B
Total Aluminum		6000	100	KM	01/03/2014 12:10	SW-6010B
Total Manganese		207	5	KM	01/03/2014 12:10	SW-6010B
Total Copper		807	5	KM	01/03/2014 12:10	SW-6010B
Total Zinc		914	5	KM	01/03/2014 12:10	SW-6010B
Ammonia Nitrogen	1.38	13800	10.0	JM	12/30/2013 08:10	SM-4500-NH3C
Organic N	4.96	49600	10.0		12/30/2013 08:10	CALCULATION
Nitrate+Nitrite-N		10.5	2.00	JM	01/02/2014 08:20	SM-4500NO3F
Total Cadmium		2.0	2.0	KM	01/03/2014 12:10	SW-6010B

All values are on a dry weight basis except as noted by asterisk. Detection limit on all N series is on a wet basis.

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Debbie Holt

DENALI_001545

Report Number: 13-357-0206

Account Number: 11035

**A&L Eastern Laboratories, Inc.**

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401 Fax (804) 271-6446

Send To: Terra Renewal LLC
12812 VALLEY VIEW ST
SUITE 9
GARDEN GROVE , CA 92845

Project : RIV
AZ#0629

Lab Number : 97234

Sample Id : RIV

REPORT OF ANALYSIS

Date Sampled: 12/19/2013 07:00:00

Date Received: 12/23/2013 00:00

Date Reported: 01/06/2014

PARAMETER	RESULT (%)	RESULT (mg/kg)	QUANTITATION LIMIT (mg/kg*)	ANALYST	ANALYSIS DATE/TIME	METHOD
Total Chromium		49	5	KM	01/03/2014 12:10	SW-6010B
Total Nickel		24	5	KM	01/03/2014 12:10	SW-6010B
Total Lead		18	5	KM	01/03/2014 12:10	SW-6010B
Total Arsenic		5.0	3.0	KM	01/03/2014 12:10	SW-6010B
Total Mercury		0.8	0.4	KM	01/02/2014 09:00	SW-7471A
Total Selenium		<5.0	5.0	KM	01/03/2014 12:10	SW-6010B
Total Molybdenum		43	5	KM	01/03/2014 12:10	SW-6010B

Comments:

SULFUR NOT FOR COMPLIANCE PURPOSES

QUALIFIER: THE MATRIX SPIKE WAS OUT OF LIMIS FOR "Fe". ALL OTHER QC DATA IS ACCEPTABLE.

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Debbie Holt

DENALI_001546